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China Report

SCIENCE AND TECHNOLOGY

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NATIONAL DEVELOPMENTS

JAPANESE AVIATION JOURNAL ON CHINESE DEVELOPMENTS IN SPACE

Tokyo KOKU JANARU [AVIATION JOURNAL] in Japanese No 95, Jun 80 pp 112-115

[Excerpts] The launch site is located on the outskirts of the town of Shuangchengzi (41° N, 101° E) which itself is located at the foot of a mountain in the Gobi Desert. It takes two hours by train to get there from the Jiuquan Airport. The town has a population of 7000 residents including both technicians and their families. The name of the train station is Dongfeng [East Wind], but it is not clear whether or not the town is of the same name.

Both NASA and Japanese representatives observed launch pads located one hour to the north by bus from Dongfeng Station. If you look at pictures taken by the LANSAT Earth Resources Satellite, it seems that the launch pads were built over a large area and centered around Shuanchengzi.

There are two well-publicized launch pads approximately 400m apart with a common, mobile service tower 56m high on a track 17m wide in between them. There is a blockhouse (launch control room) for each tower. There is only one set of equipment and it seems that it is moved into whichever blockhouse is involved whenever there is a launch. While the technological level of the machinery cannot be said to be the most up-to-date, it is a source of pride with the Chinese that they built it all themselves.

Facilities Involved In Space Development In China

No	Placename	Type of facility	Function, etc.
1.	Baicheng	Missile firing site [MFS]	NA
2.	Changchun	Satellite tracking station [STS]	NA
3.	Beijing	Dongfeng Scientific Instruments Plant	Satellite design, construction and testing
	"	Engineering Environmental Test Center	Satellite space environment testing, 3 space chambers of varying size

	Beijing	Control Engineering Institute	Satellite attitude, and the development and construction of propulsion systems
	"	Aerodynamics Institute	Aeromechanical research, 3 wind tunnels
	"	Rocket Engine Test Center	Rocket engine fuel tests
	"	Ground Communication Offices--Satellites	Communications relay based on Intelstat, 2 offices
4.	Wuzhai	MFS	NA
5.	Yinchuan	Missile plant	NA
6.	Shuangchengzi	Rocket firing site	Satellite launching, missile testing
7.	Jiuquan	STS	CW radar, pulse radar
8.	Kaxgar	STS	NA
9.	Lanzhou	Physics Academy	Vacuum technology in space chambers, ion rocket research
10.	Xian	Satellite Measurement and Control Center	Satellite tracking and control
	"	Radio Technology Institute	Construction of electronic equipment for satellites
	"	Astrophysics Institute	The development of measuring instruments, particle detectors and sensors
	"	Shaanxi Microelectronics Academy	The development and production of microelectronic chips
11.	Shanghai	Booster assembly plant	FB-1 production
	"	Xinxin Machinery Plant	The development and production of rocket engines
	"	Huayin Machinery Plant	The development of weather satellites
	"	Scientific Instruments Plant	The manufacture of sensors
	"	Technology and Physics Institute	The manufacture of sensors
	"	Xinyue Medical Electronics Plant	The manufacture of rocket engine servo(s)

	Shanghai	Satellite Communication Ground Station	Communication relay based on Intelstat
12.	Nanjing	Satellite Communication Ground Station	Communication experiments based on Symphonie and Yuri
13.	Wuhan	Missile plant	NA
14.	Weinan	STS	NA
15.	Nagqu	MFS	NA
16.	Lhasa	STS	NA
17.	Kunming	STS	NA
18.	Nanning	STS	NA

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APPLIED SCIENCES

USES OF HIGH-DEFINITION TELEMETRY DETECTION SATELLITE

Paris AIR & COSMOS in French 8 Mar 80 pp 46-47

[Article by Albert Ducrocq]

[Text] The SPOT satellite was extensively discussed during the preliminary meetings between Chinese specialists and CNES [National Center for Space Studies] representatives. The Chinese expressed their interest in this high-definition telemetry detection satellite. They did not conceal their desire to make use of its technology and receive its pictures.

French officials were somewhat disturbed by these statements, taking into account a political and military context whose features are known to all. The SPOT satellite will be capable of identifying objects some 10 meters in size. This means that, for the Chinese, it would represent the ideal tool with which to observe everything happening in the USSR, close to the border. Thanks to the negatives, the Chinese would have detailed information on Soviet military facilities in their vicinity.

This could be interpreted as giving aid to China, which the Russians would not appreciate in the least. Hence the dilatory answer given the Chinese. As was pointed out to them, this answer appears technically justified, the more so since it will be several years before the SPOT satellite is operational.

Everybody knows about what happened. The Chinese traded with the Americans who, apparently, were not embarrassed by this kind of scruples: a receiving station for Landsat pictures is to be set up near Beijing with the use of the most sophisticated electronic devices capable of producing at will thematic maps and colored compositions of all kinds.

Better still: during the conclusion of the agreement between the Chinese and the Americans pertaining to that subject, it was pointed out that, in reality, it involved supplying China with a machinery capable of having military applications.

To be sure, the fact remains that the Landsat program is a civilian program. Above all, although it is true that a land resource satellite could occasionally serve as an excellent observation vehicle, to think that it would be used essentially for that purpose would be to make a most serious error in judgment. Regardless of the military benefit which the Chinese could garner from the Landsat pictures, we must realize that the civilian consequences of their use will be incomparably more important. Today, China is offering us an unprecedented example, that of a huge country with enormous resources--in many respects, the biggest in the world--currently undergoing an important technological development. It intends relying on space photography to organize and, in particular, plan its energy development.

Hydraulic Resources

Firstly, China is counting on space photography to formulate a plan for the exploitation of its fantastic hydraulic power.

It is an enormous problem if there ever was one. And, in this case, a virtually unknown one. Everybody knows that the highest mountains in the world are the Himalayas--a vast range which covers the whole western section of China spread over 1 million square kilometers. Yet, few people have inferred the logical consequence, namely, that the country owning this range and the plains irrigated by its rivers has at its disposal, ipso facto, the largest hydraulic power potential of the planet.

You be the Judge

The Yangtze basin alone should be able to supply 1,000 TWh annually (or 15 times the total volume of French hydraulic power) of which 600 generated by the river itself whose output at the mounth reaches 35,000 cubic meters per second, and 400 by its tributaries. Some 300 TWh could be expected from the Sikiang, a short river (2,655 kilometers long as compared to 4,990 for the Yangtze), but whose output reaches 12,000 cubic meters per second. As for the Mekong, its share promises to be 300 TWh. This river, 4,023 kilometers long with an output of 15,500 cubic meters per second, was once presented in textbooks as an Indochinese river. Actually, its source is in Tibet, in the immediate vicinity of the Yangtze and, under the name of Dza Tchou, it is Chinese over most of its course where its altitude is the highest and, consequently, its hydroelectric potential is the greatest. The same applies to the Brahmaputra, a river with an output of 19,000 cubic meters per second, which is Indian only over its lower reaches: the Brahmaputra could supply 500 TWh to the Chinese. On the whole, China's hydraulic potential would exceed 2,300 TWh, of which more than half could undoubtedly be harnessed (as compared with France where only a quarter of the theoretical potential is considered worthwhile harnessing).

We are speaking in the conditional, for right now, we are dealing with rough estimates, only because, in many of the cases, the Chinese lack precise data which is precisely what they hope to obtain from space photography.

However, there is something undoubtedly more important still. In truth, the question is not to know all the energy that China could some day produce from its rivers, while their hydroelectric potential is not even being exploited at 3 percent, but to decide what equipment should receive priority.

It is not easy to formulate options based on conventional maps which provide no more than fragmentary information. The advantage of space photography is that it helps to determine the totality of sites where dams could be built and their respective advantages, estimated cost and, in each case, the consequences of their construction.

The Options

The Chinese have essentially two major prospects:

Give priority to the harnessing of the Yangtze and its tributaries. It is the solution which seems to be called for, considering that the Yangtze basin covers a large section of China's industrial region, so that the produced electric power would be used locally. But there is a huge inconvenient here: in Eastern China, the river's altitude is low, the building of dams across the Yangtze would lead to the flooding of vast areas now occupied by populations that would have to be relocated. Naturally, some industrial facilities would have to disappear. Some tributaries of the Yangtze, like the Ialung, the Tung Ho, the Min Kiang and, above all, the Kialing Kiang offer magnificient gorges, but then, the energy would be essentially produced in Western China, far from the industrialized areas.

Or else, conversely, concentrate for the present on the river which is known as Brahmaputra to us and Tsang Po to the Chinese. It runs on Chinese territory paralleling the Sino-Indian border for 1,000 kilometers. It is in that area that it presents the most extraordinary possibilities for harnessing it with the "short-circuits" to which its capricious course could be subjected. But here again, there is the inconvenience of supplying electricity from a distance, whose transportation toward the eastern areas is bound to pose problems.

Currently, it is toward that second solution which Chinese leaders seem clearly to be leaning. Their policy could consist of asking Eastern China to produce electricity in coal-fired stations while large-scale facilities would be built on the Brahmaputra, along with the creation of large-scale local industries. In any case, such is the formula which would allow the acquisition of maximum energy in minimum time, with minimum means, especially if the sites on the Brahmaputra are well chosen. Consequently, under such circumstances, space photography becomes extremely important. It provides synthesized pictures of a region which, only yesterday, had been barely mapped out; these photographs should help to formulate the fastest and most efficient installations program.

Two Petroleums

With regard to petroleum, the situation is remarkably similar inasmuch as the Chinese can play two cards with respectively traditional continental petroleum and off-shore exploitation.

Throughout the world, continental petroleum has been of primary interest. It is essentially when it began to be depleted that, for lack of something else, companies began off-shore exploitation. Everything is happening as though the Chinese intended to develop the opposite by giving priority to off-shore exploitation considered more likely to give them the greatest resources in the shortest time, thanks to the use of existing methods which foreign companies are quite willing to place at their disposal. Thus, the Chinese continental shelf is beginning to be dotted with platforms installed, in particular, by Exxon, Mobil, Caltex and Phillips in the China Sea and BP [British Petroleum], Elf-Aquitaine and Total in the Yellow Sea.

This priority given to off-shore exploitation has a technical reason: the size of petroleum reserves under the Chinese continental shelf. The basic geographic reason is that the extent of the shelf is believed to account, alone, for 5 percent of the world's continental shelf. What are the reserves of this Chinese continental shelf? An estimated 10 billion tons is the figure most often cited by experts; however, many of them believe that the actual size of these reserves is much greater.

All agree that the Chinese continental petroleum deposits must even be bigger, since geology teaches us that one third of China's territory consists of possibly oil-bearing land. This Chinese continental petroleum has not been assessed but, at least, the scope of the range--15 to 100 billion tons--might prove the extent of our ignorance and that of the Chinese themselves who, precisely, count on space photography to resolve the problem.

It would be too good if we could see petroleum from space. It is possible, however, to locate sedimentary formations and to identify in them interesting structures in which drilling should be done. Also, when a drilling has been successful, space photographs are of extraordinary interest both for giving an idea of the probable dimentions of the deposit and to indicate the site where new drillings should be conducted.

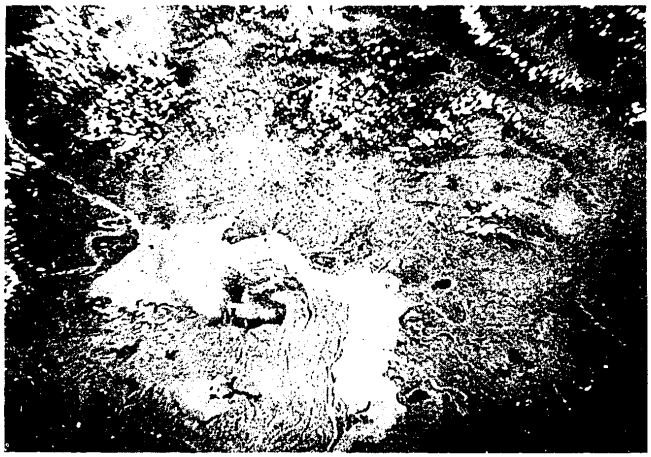
Toward Extensive Production

The Chinese do not hide their wish to see their country become the world's leading petroleum producer before the end of the century and this within the framework of a policy which will safeguard their future, meaning that their concern will be to set an extraction rate controlled by the size of the entire reserve. Undoubtedly, it is not fortuitious that the bids requested by the Chinese government from American, English-Dutch and Italian groups for the development of a vast petroleum prospection program coincide with an extreme interest shown in the use of space photography to assist that

program. We found it extremely meaningful that, last year, in the framework of the meetings between the United States and China, prior to the latter's acquisition of a Landsat station, the American delegation--led by the head of energy research for the US Geological Survey--was the guest of the Chinese Ministry of Petroleum Industry.

It should be noted that, on that occasion, the specialists made a rather surprising discovery. From a space photograph, they noted that the Tsaidam basin in Western China had a structure identical to a formation in Wyoming known as Uinta, both having evidently a lacustrian origin so that the comparison of their evolution--only possible in the age of satellites--should allow the definition of laws common to the origins of several terrestrial basins and a better understanding of Earth.

Visible to the right of the picture, the Kiao Ling Kiang--a tributary of the Yangtze--drops 3,000 meters over 500 kilometers. The dam supplying the Chinese uranium enrichment plant was built on the Sining Ho, a tributary of the Kiao Ling Kiang.



When it enters Lake Tongting, the Yangtze is only 200 meters above sea level while still some 1,000 kilometers away from its mouth. It is downstream from that lake--i.e., in Western China--that the river hydraulic potential will essentially have to be exploited.

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